

DRAFT

ENGINEERING EVALUATION Terra Millennium Corporation, Plant: 17921 Application: 14916

BACKGROUND

Terra Millennium Corporation (Terra) has applied to obtain an Authority to Construct (AC) and/or a Permit to Operate (PO) for the following CARB-certified diesel engine that will be used to power a standby generator located at “1060 Hensley Street” in Richmond, CA:

S-1 271 kW Emergency Standby Diesel Generator
Cummins Diesel Engine; Model: QSL9-G2; 364 BHP
EPA/CARB Family: 6CEXL0540AAB
CARB Executive Order: U-R-002-0331

EMISSIONS

Annual Average Emissions:

Basis: - 364 hp output rating
 - 50 hr/yr operation for testing and maintenance (ATCM limit)
 - NO_x, VOC, CO and PM₁₀ emission factors from CARB certification data:

NO_x: 2.76 g/hp-hr
VOC: 0.15 g/hp-hr (assume all POC compounds)
CO: 2.4 g/hp-hr
PM₁₀: 0.12 g/hp-hr

NO_x:

= (50.0 hr/yr)(364 hp)(2.76 g/hp-hr)(lb/454 g)
= **111 lb/yr** = (111 lb/yr)(1 ton/2000 lb) = **0.055 TPY**

POC:

= (50.0 hr/yr)(364 hp)(0.15 g/hp-hr)(lb/454 g)
= **6.01 lb/yr** = (6.01 lb/yr)(1 ton/2000 lb) = **0.003 TPY**

CO:

= (50 hr/yr)(364 hp)(2.4 g/hp-hr)(lb/454 g)
= **96.2 lb/yr** = (96.2 lb/yr)(1 ton/2000 lb) = **0.048 TPY**

PM₁₀:

= (50 hr/yr)(364 hp)(0.12 g/hp-hr)(lb/454 g)
= **4.81 lb/yr** = (4.81 lb/yr)(1 ton/2000 lb) = **0.0024 TPY**

SO₂ emissions are quantified based on the full conversion of 0.05 wt% (~ 500 ppm) sulfur in the diesel fuel with a density of 7.206 lbs/gal that is consumed at a rate of 11.4 gal/hr.

SO₂:

= (0.0005 lb S/lb fuel)(7.206 lb fuel/gal fuel)(11.4 gal fuel/hr)(64 lb SO₂/32 lb S)(50 hr/yr)
= **4.11 lb/yr** or **0.0021 TPY**

Daily Emissions:

Daily emissions are calculated to establish whether a source triggers the requirement for BACT (10 lb/highest day total source emissions for any class of pollutants). 24-hr/day of operation will be assumed since no daily limits are imposed on intermittent and unexpected operations.

NO_x:

$$= (24 \text{ hr/day})(364 \text{ hp})(2.76 \text{ g/hp-hr})(\text{lb}/454 \text{ g}) = \mathbf{53.1 \text{ lb/day}}$$

POC:

$$= (24 \text{ hr/day})(364 \text{ hp})(0.15 \text{ g/hp-hr})(\text{lb}/454 \text{ g}) = \mathbf{2.89 \text{ lb/day}}$$

CO:

$$= (24 \text{ hr/day})(364 \text{ hp})(2.4 \text{ g/hp-hr})(\text{lb}/454 \text{ g}) = \mathbf{46.2 \text{ lb/day}}$$

PM₁₀:

$$= (24 \text{ hr/day})(364 \text{ hp})(0.12 \text{ g/hp-hr})(\text{lb}/454 \text{ g}) = \mathbf{2.31 \text{ lb/day}}$$

SO₂ emissions are quantified based on the full conversion of 0.05 wt% (~ 500 ppm) sulfur in the diesel fuel with a density of 7.206 lbs/gal that is consumed at a rate of 11.4 gal/hr.

SO₂:

$$= (0.0005 \text{ lb S/lb fuel})(7.206 \text{ lb fuel/gal fuel})(11.4 \text{ gal fuel/hr})(64 \text{ lb SO}_2/32 \text{ lb S})(24 \text{ hr/day}) = \mathbf{1.97 \text{ lb/day}}$$

PLANT CUMULATIVE INCREASE

Terra Millennium Corporation is a new facility. Therefore, the District's database does not contain information on existing emissions at the plant. Table 1 summarizes the cumulative increase in criteria pollutant emissions that will result from S-1.

Table 1: Cumulative Criteria Pollutant Increases from S-1

| Pollutant | Increase in Emissions At Plant Since April 5, 1991¹ (TPY) | Increase in Emissions Associated With This Application (TPY) | Total Emissions (Post 4/5/91 + Increase) (TPY) |
|------------------|---|---|---|
| SO ₂ | 0 | 0.0021 | 0.0021 |
| NO _x | 0 | 0.055 | 0.055 |
| VOC | 0 | 0.003 | 0.003 |
| CO | 0 | 0.048 | 0.048 |
| PM ₁₀ | 0 | 0.0024 | 0.0024 |

TOXIC RISK SCREENING ANALYSIS

The cancer risk is calculated based on the emission rate of diesel exhaust particulate matter. Diesel exhaust particulate matter is used as a surrogate for all toxic contaminants found in

¹ In PSDP do the following steps to get data on the aggregate sum of all increases as defined in Reg. 2-2-212 after April 5, 1991: option 1 → type of pollutant.

diesel exhaust. Because the proposed emissions (4.81 lbs/yr for 50 hours) exceed the risk screening trigger level for diesel exhaust particulate matter in Table 2-5-1 (0.58 lb/yr), a risk screening was performed.

Per the September 29, 2006 memo from Catherine Fortney, local "CHV" meteorological data was available for the site, and an ISCST3 model for PM10 exposure was used to estimate maximum annual average ambient PM10 concentrations. Distance and directionality were used as the primary considerations to determine sites of maximum exposure. The site is in a light industrial/commercial zone, with the closest residential receptor located approximately 280 feet from the proposed site and Peres Elementary School's closest border within 580 feet.

At 50 hr/yr operation, the results from the health risk screening analysis indicate that the increased maximum cancer risk for residents near the facility is estimated at approximately 0.87 in a million with a hazard index of 0.00053, the increased maximum cancer risk for workers near the facility is estimated at 1.47 in a million with a hazard index of 0.00104, and the increased maximum cancer risk for students attending Peres Elementary School is estimated at 0.02 in a million with a hazard index of 0.00005. These health risk values meet the criteria for acceptable levels for an engine such as S-1 established in the BAAQMD's Regulation 2, Rule 5 so long as the engine meets current TBACT requirements.

PUBLIC COMMENT

The public notice will be posted on the internet and mailed to all Parents or Guardians with children enrolled at Peres Elementary School. It will also be mailed to all residential neighbors located within 1000 feet of the proposed new source of pollution.

BACT

BACT is triggered for NO_x and CO since the maximum daily emissions of the above pollutants exceeds 10 lb/day as seen in the Daily Emissions section on pages 1 and 2. Please refer to the discussion on "Daily Emissions" in page 2 of this evaluation. BACT for this source is presented in the current BAAQMD BACT/TBACT Workbook for this source category as shown below:

| Source: | <i>IC Engine - Compression Ignition</i> | | Revision: | <i>5</i> |
|-----------|--|--|--|------------------------|
| | | | Document #: | <i>96.1.2</i> |
| Class: | <i>> or = 175 horsepower output rating</i> | | Date: | <i>01/11/02</i> |
| POLLUTANT | BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT | | TYPICAL TECHNOLOGY | |
| POC | 1. 0.30 g/bhp-hr [62 ppmvd @ 15% O ₂] ^{a,b} 2. 1.5 g/bhp-hr [309 ppmvd @ 15% O ₂] ^{b,c} | | 1. Catalytic Oxidation and CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine ^{a,b} 2. CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine ^{b,c} | |

| | | |
|------------------|---|--|
| NO _x | 1. 1.5 g/bhp-hr [107 ppmvd @ 15% O ₂] ^{a,b} 2. 6.9 g/bhp-hr [490 ppmvd @ 15% O ₂] ^{a,b,c} 3. 6.9 g/bhp-hr [490 ppmvd @ 15% O ₂] ^c | 1. Selective Catalytic Reduction (SCR) + Timing Retard + Turbocharger w/ Intercooler ^{a,b} 2. Timing Retard ≤ 4° + Turbocharger w/ Intercooler ^{a,b,c} 3. Timing Retard ≤ 4° + Turbocharger w/ Intercooler |
| SO ₂ | 1. n/d 2. fuel oil < 0.05% sulfur ^{a,b} | 1. n/d 2. Fuel Selection ^{a,b} |
| CO | 1. n/s 2. 2.75 g/bhp-hr [319 ppmvd @ 15% O ₂] ^{b,c} | 1. Catalytic Oxidation ^b 2. CARB or EPA (or equivalent) low-CO emitting certified engine ^{b,c} |
| PM ₁₀ | 1. n/d 2. If practical, gas-fueled engine or electric motor. If not, "California Diesel Fuel" (fuel oil w/ < 0.05% by weight sulfur and < 20% by volume aromatic hydrocarbons) ^b 3. 0.1 grams/bhp-hr | 1. Catalyst Guard Bed ^{a,b} 2. Fuel Selection ^{b,d} 3. CARB or EPA (or equivalent) low-particulate matter emitting certified engine, or particulate filter |
| NPOC | 1. n/a 2. n/a | 1. n/a 2. n/a |

References

- a. CARB/CAPCOA Clearinghouse
- b. BAAQMD NOTE: IC Engine BACT and TBACT is a low emitting, spark-ignited, gas-fueled engine with lean burn combustion or rich burn with non-selective catalytic reduction, or electric motor. A diesel engine will be permitted only if a gas-fueled engine, or electric motor, is not practical (e.g., a remote location without natural gas availability or electric power, or only a diesel engine will meet the portability and/or power/torque/rpm requirements of the application under review, or the engine is used exclusively for emergency use during involuntary loss of power).
- c. Timing retard, etc. controls alone may be acceptable only in very limited situations for temporary sources.

It can be seen from above that S-1 satisfies the current BACT 2 standards for NO_x (6.9 g/hp-hr) and CO (2.75 g/bhp-hr). The more restrictive BACT 1 standard is not applicable to this engine per Reference b above because it will be limited to operation as an emergency standby engine.

Since CARB certification data was used to establish the emission factors for NO_x (2.76 g/bhp-hr) and CO (2.4 g/bhp-hr), the BACT 2 NO_x (6.9 g/bhp-hr) and CO (2.75 g/bhp-hr) emission limits will not be incorporated into the permit conditions. Compliance with BACT 2 will be assumed through the design standards demonstrated by the CARB certification testing.

CARB STATIONARY DIESEL ENGINE ATCM

The State Office of Administrative Law approved the Airborne Toxic Control Measure (ATCM) on November 8, 2004. State law requires the local Air Districts to implement and enforce the requirements of the ATCM. Effective January 1, 2005, there is a prohibition on the operation of new diesel emergency standby engines greater than 50 bhp unless the following operating requirements and emission standards are met:

“Stationary Diesel Engine ATCM” section 93115, title 17, CA Code of Regulations.**Diesel PM – General Requirements**

1. Meet 0.15 g/bhp-hr PM standard
2. Operate 50 hours per year, or less, for maintenance and testing (except emergency use and emissions testing)

HC, NO_x, NMHC+NO_x, CO

1. Meet standards for off-road engines of the same model year and horsepower rating as specified in the OFF-Road Compression Ignition Engine Standards; or if no standards have been established
2. Meet the Tier 2 standards in Title 13, CCR, Section 2423 for off-road engines of the same horsepower rating, irrespective of the new engine's model year

The emergency standby diesel engine (S-1) complies with the above ATCM requirements. The diesel engine will operate for no more than 50 hours per year for maintenance and reliability testing. This engine is subject to the EPA Tier 2 requirements for HC, NO_x, NMHC+NO_x, and CO. As shown in the table below, the engine meets these requirements.

Table 2. Comparison of CARB and ATCM Tier 2 Standards

| Pollutant | CARB g/bhp-hr | ATCM Tier 2 g/bhp-hr |
|--------------------|------------------|----------------------------|
| HC (POC) | 0.15 | N/A |
| NO _x | 2.76 | N/A |
| HC+NO _x | 2.91 | 4.8 |
| CO | 2.4 | 2.6 |
| PM | 0.12 | 0.15 |

OFFSETS

Terra Millennium Corporation is a new facility. Therefore, the District's database does not contain information on existing emissions at the plant. Table 3 summarizes the increase in criteria pollutant emissions that will result at Plant 17921 from the operation of S-1.

Table 3: Increased Emissions Offset Trigger Level Evaluation

| Pollutant | Current Emissions at the Plant ² (TPY) | Increase in Emissions Associated With This Application (TPY) | Total Emissions (Existing + Increase) (TPY) | Regulation 2-2-302 and 2-2-303 Offset Triggers (TPY) |
|------------------|--|---|--|---|
| SO ₂ | 0 | 0.0021 | 0.0021 | > 1 |
| NO _x | 0 | 0.055 | 0.055 | > 10; < 35 |
| POC | 0 | 0.003 | 0.003 | > 10; < 35 |
| CO | 0 | 0.048 | 0.048 | NA |
| PM ₁₀ | 0 | 0.0024 | 0.0024 | > 1 |

It can be seen from Table 3 above that offsets are not warranted for NO_x and POC, since the individual emissions of the above pollutants is less than 10 TPY. In addition, per Regulation 2-2-303 an increase in emissions of SO₂ and PM₁₀ from a new or modified source at a Major Facility needs to be offset only if the cumulative increase in emissions for the above pollutants minus any contemporaneous emission reduction credits provided by a facility for those pollutants since April 5, 1991 exceeds 1 TPY. Terra Millennium Corporation is not a Major Facility as defined in Regulation 2-6-212. Therefore, offsets are not warranted for SO₂ and PM₁₀.

STATEMENT OF COMPLIANCE

S-1 will be operated as an emergency standby engine and therefore is not subject to the emission rate limits in Regulation 9, Rule 8 ("NO_x and CO from Stationary Internal Combustion Engines"). S-1 is subject to the monitoring and record keeping requirements of Regulation 9-8-530 and the SO₂ limitations of 9-1-301 (ground-level concentration) and 9-1-304 (0.5% by weight in fuel). S-1 is also subject to Regulation 9-8-330 and its limitations on hours of operation. Regulation 9-8-530 and 9-8-330 requirements are incorporated into the proposed permit conditions. Compliance with Regulation 9, Rule 1 is very likely since diesel fuel with a 0.05% by weight sulfur is mandated for use in California. Like all combustion sources, S-1 is subject to Regulation 6 ("Particulate and Visible Emissions"). This engine is not expected to produce visible emissions or fallout in violation of this regulation and will be assumed to be in compliance with Regulation 6 pending a regular inspection.

This application is considered to be ministerial under the District's Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.

This facility is within 1,000 feet from the nearest school and therefore is subject to the public notification requirements of Regulation 2-1-412.

PSD, NSPS and NESHAPS are not triggered.

Source complies with state ATCM requirements. Appropriate permit conditions are included to ensure compliance.

² Db → q2 → p → all

PERMIT CONDITIONS

COND# 22850 -----

1. Operating for reliability-related activities is limited to 50 hours per year per engine.

[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]

2. The owner or operator shall operate each emergency standby engine only for the following purposes: to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, state or Federal emission limit, or for reliability-related activities (maintenance and other testing, but excluding emission testing). Operating hours while mitigating emergency conditions or while emission testing to show compliance with District, state or Federal emission limits is not limited.

[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]

3. The owner/operator shall operate each emergency standby engine only when a non-resettable totalizing meter (with a minimum display capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained.

[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(G)(1)]

4. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been issued a Title V Major Facility Review Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.
 - a. Hours of operation for reliability-related activities (maintenance and testing).
 - b. Hours of operation for emission testing to show compliance with emission limits.
 - c. Hours of operation (emergency).
 - d. For each emergency, the nature of the emergency condition.

e. Fuel usage for each engine(s).

[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(I), (or Regulation 2-6-501)]

5. At School and Near-School Operation:

If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply:

The owner or operator shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:

- a. Whenever there is a school sponsored activity (if the engine is located on school grounds).
- b. Between 7:30 a.m. and 3:30 p.m. on days when school is in session "School" or "School Grounds" means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). "School" or "School Grounds" includes any building or structure, playground, athletic field, or other areas of school property but does not include unimproved school property.

[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(1)] or (e)(2)(B)(2)]

RECOMMENDATION

Issue Terra Millennium Corporation an A/C for the following equipment:

- S-1** 271 kW Emergency Standby Diesel Generator
Cummins Diesel Engine; Model: QSL9-G2; 364 BHP
EPA/CARB Family: 6CEXL0540AAB
CARB Executive Order: U-R-002-0331

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